KUNGL. SKOGSHÖGSKOLANS SKRIFTER

BULLETIN OF THE ROYAL SCHOOL OF FORESTRY
STOCKHOLM, SWEDEN

No. 23b Editor: Professor LENNART NORDSTRÖM 1957

INFLUENCE OF OWNERSHIP AND SIZE STRUCTURE ON FOREST MANAGEMENT IN SWEDEN

A study of fundamentals

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STOCKHOLM 1957
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Introduction

Over a number of years discussion has continued in Sweden on the controversial question of whether the forest is managed better on the large or on the small holding. This discussion has broadened to cover another aspect of forestry enterprise — the form of ownership. This was only natural, since large-scale holdings are predominantly in the hands of the State and industrial forestry enterprises, whereas the small-scale forestry is largely the concern of the agricultural population.

The following analysis will be simplified by neglecting the intermediate forms with respect to the size of holdings and other kinds of forest ownership (other public forests, private estates, etc.).

The form of enterprise can have a considerable influence both on the forest yield and on the over-all efficiency of the forest economy. The *form of ownership* may be said to exert such an influence by determining the policy for the management of the forest enterprise, whereas the *size of the holding* exerts its effect on the economy through its influence on the efficiency in the exploitation of the resources available for the realization of this policy.

I. Distribution of ownership

According to the 1951 statistics of land ownership the total productive forest area is distributed according to ownership as shown in the following table:

	State		Other public		Company		Other private		Total area
	1000 hectares	per cent	1000 hectares	per cent	1000 hectares	per cent	1000 hectares	per cent	1000 hectares
Northern Sweden	3,020	43.3	400	5.2	1,129	16.2	2,425	34.8	6,974
Central Sweden	659	7.2	577	6.3	3,703	40.6	4,182	45.9	9,121
Southern Seweden	469	7.3	464	7.3	747	11.7	4,711	73.7	6,391
Total	4,148	18.5	1,441	6.4	5,579	24.8	11,318	50.3	22,486

Company owners consist almost entirely of forest industries.
Other private owners are chifly the agricultural population.
One hectare = 10.000 sq. metres = 2.471 acres

The greater part of the land assigned to *Other private* forms of ownership consists of the farm woodlands, which are managed jointly with farming; they are generally rather small holdings. Into this category also come: the forest estates, which are usually large holdings; tenant holdings, for which the connection with farming is looser, especially as regards policy of management; and forest property having no connection at all with agriculture, and covering a total area of 0.9 million hectares (8 per cent). There are also many farms that have no forest land, especially in the agricultural regions of southern Sweden.

The distribution of the forest land according to the size of the holdings is shown below.

Size of holding	Total area hectares	State hectares	Other public hectares	Company hectares	Other private hectares
—10 hectares ...	526,823	5,336	5,458	3,891	512,138
10—25 » ...	1,380,767	7,396	16,073	10,627	1,346,671
25—50 » ...	2,218,411	8,631	36,906	19,040	2,153,834
50—100 » ...	2,619,121	17,417	74,194	39,122	2,488,388
100—200 » ...	2,336,380	34,378	105,194	79,568	2,117,240
200—400 » ...	1,688,041	56,218	105,205	158,204	1,368,414
400— » ...	11,499,443	3,933,536	976,844	5,304,782	1,284,281
Total	22,268,986	4,062,912	1,319,874	5,615,234	11,270,996

A little more than one half of the total forest area is managed as large holdings, this term being taken to cover the State forests, most of the other public forests, the woodlands of the forest industries and most of the forest estates. The remaining half consists of small holdings — predominately farm woodlands.

II. The size of the holding as a factor in the efficiency of management

1. General aspects

It has been often asserted in the past that a sustained yield and rational management are possible only on the larger holdings; that is to say, on those forest lands that as a rule are owned and managed by the State and the forest industries. This view implies that forestry pursued on smaller holdings by the agricultural population, on the other hand, would lack the essential requirements for sustained yield and rational working.

A precise assessment of the significance of the size of the holding to the efficiency of management is difficult to make since forestry on the smaller holdings is generally carried on jointly with farming, whereas the larger units are in most cases either integrated with wood conversion plants or else

owned by the State or other public authorities. The influence of the size of the holding on the forest yield and on the economic outcome of forestry cannot therefore be distinguished from the influence of the form of ownership. Discussion of the size of the holding must for this reason be confined to an analysis of the possibilities for efficient management of the various forms of enterprise on the basis of generally known conditions. Little study has hitherto been made of the influence of the size of the holding on the efficiency of management.

It is a recognized fact that large-scale operation is frequently superior, owing chiefly to the economic advantages inherent in mass production and the opportunity for specialization and mechanization. Nevertheless, even if the larger enterprises are clearly predominant in certain branches of the national economy — and especially in industry — smaller enterprises are in most branches very numerous and display a marked capacity for competition and development.

As far as agriculture is concerned — and this is in many respects closely allied to forestry — practical experience and studies in Sweden indicate that the small unit is considerably less profitable, even in a relative sense, than the larger. The main reason for this is that with the diminishing size of the holding the use of labour-saving equipment must be reduced accordingly.

It is then necessary to resort to the more expensive sources of power — man and draught animals. There is, however, a size of holding below which even the essential implements and machines cannot be exploited to the full, and human labour likewise. This still further reduces the profitableness, and with it the total income. These farms are too small for economic management and they represent quite a problem in the national economy.

Essentially the same argument should in principle be applicable to forestry. If one of the main reasons for the small farm holding is that the advantages of mechanization cannot be exploited to a sufficient extent, it may be asked whether the same is not true of forestry.

The question of the extent to which good silviculture is practised on holdings of various sizes has also given rise to much controversy. It should be noted at this point that the level of silviculture is certainly dependent on more factors than the size of the holding — and above all on the form of ownership —, but, as is shown below, the size factor is in itself so influential that it cannot be neglected.

2. Size of holding as a factor in rationalization

Forestry provides the largest remaining demand for heavy labour in this country. It is therefore natural that as far as is practicable the human and

animal labour, which is becoming increasingly expensive, should be replaced by mechanical power. Nevertheless, even after the more recent active interest in the rationalization of forest work, principally through its mechanization, forestry is still far behind agriculture in this respect.

The mechanization that has been effected has been developed and applied mainly on the large holdings. Examples of this mechanization are transport by motor truck and tractor; use of tractors for road construction and maintenance, and for drainage and scarifying; felling by power saw, and mechanical barking. Among the other measures of rationalization relating to felling and transport are the improvement of hand implements, loading and transport arrangements and, to increase the working efficiency, tool maintenance and job study. The wide research and experimental activity required for this rationalization has been carried out through special organizations set up and financed by the Swedish Forest Service and the forest industries.

The fact that large-scale forestry enterprises have taken the initiative in the rationalization of felling and other heavy forest work does not necessarily mean that the advantages thereof could not be exploited by the smaller concern. In fact, there would appear to be ample scope for applying these measures on the smaller holdings. The concentration of the fellings, and consequently of seeding and planting, as practised by the large forest enterprises is not absolutely essential for the exploitation of the advantages of mechanization. For instance, power saws and trucks may also be used with advantage on the small holding. The improved design of hand implements, means of transport and loading equipment can be of as great value to the small unit as to the large. The same applies to the application of improved methods in tool maintenance and the results of job study, provided that the workers have received a certain amount of training. Investigation has shown that plantation work is considerably more expensive per hectare for small than for large areas. This cost item is, admittedly, not very great for the small holding, but on the other hand the need for labour for planting falls during the busiest farming season when it can least be spared. The great importance of taking good care of felled timber in order to avoid damage through storage has in recent years been reflected in the research that has been concentrated in this field, and in the formulation of instructions for attention to the felled timber that is stored in the forest waiting for transportation; these are valid for small-scale as well as large-scale enterprises. The same is true of the marking off into log lengths which should be so conducted as to ensure the maximum yield from each tree, and thus from each cutting. A problem which is at present occupying much attention is the employment of the farm tractor in the forests.

By way of summary, it may be said that while on the small holding the opportunities for exploiting the experience gained in rationalization in

forest work are not as great as for the larger enterprise, they may still be regarded as considerable. The chief problem for the owner of the small holding would appear to lie in the actual application of this experience.

3. Size of holding as a factor in rational silviculture

The efforts to exploit the productive capacity of forest land to the greatest advantage has led to a gradual increase in the knowledge of how to practise rational silviculture under varying external conditions. Here, too, the size of the holding comes into the picture.

Size itself, in the case of the small holding, need not constitute an obstacle to rational management. It is only when the holding is quite small — perhaps a few acres — that difficulties arise such as from the necessity for selection felling when, in fact, — as is often the case in Sweden — from a strictly silvicultural point of view the situation might call for clearcutting for regeneration. This easily results in under-stocked forests and reduced production. This is true, but to a lesser extent, of other sizes of holdings, but then it is due to other factors, generally concerned with the neglect of the silvicultural principles under the prevailing conditions.

A much more important factor in rational management is the availability of trained personnel in so far as the owners of the forest do not themselves have a sufficient knowledge of silviculture. A basic knowledge of the principles of silviculture is also essential for the application of the results of the research in this field.

The need for trained personnel is most easily met by forestry concerns large enough to bear the expense involved. The State and the larger industrial enterprises have been able to go a step further in realizing the advantages of large-scale operation by effecting some degree of specialization of their trained personnel (surveyors, drainage-, road- and building-engineers).

The inability of the small owner to employ trained personnel would be a serious disadvantage were the demand not to some extent met by the personnel of the local forestry boards, the importance of whose activities cannot be overrated. These boards have further been the medium by which the more progressive small owners have received training in the elementary principles of silviculture; many small owners have availed themselves of this opportunity and now manage their forests themselves. It is intended that as many as possible of them shall have the chance of attending training courses of various kinds.

The limiting factor in this case is the difficulty experienced by the small forest owner, who is generally occupied primarily with agriculture, in finding the necessary time for improving his knowledge of forestry; moreover, not all of them are interested in doing so.

In the last instance it is important to take into account the interaction between technical knowledge and other factors bearing on the standard of silviculture attained on different forest holdings. If there is no readiness to bear the cost for the required measures, even the best technical knowledge will be of no avail. Where this readiness exists, however, even an elementary knowledge of the principles of forestry will go far to ensure a good yield in timber and money, to which quite a number of model farm forests bear witness. The greater the investment in forestry in the form of labour and forest capital, the greater the need for technical knowledge in order to derive maximum benefit from further investment. In the large forest enterprise, for which the cost of labour is the same as for other industries, and which is dependent for its existence on the yield of its forests, it is essential to be able to employ the best expert knowledge available. The same should be true, however, of the forestry boards which have the responsibility for advising the owners of the small holdings which together constitute the most valuable part of Sweden's forest land.

It has, however, been asserted that the small holding permits more intensive forestry than does the large enterprise, since the owner can get to know his forest more intimately, down even to the individual tree, and can adapt his measures accordingly. This is in contrast to the standardization of management which is in some degree inevitable in the large concerns, with their extensive holdings and the need to apply the felling and silvicultural measures to fewer but larger areas. For the realization of such intensive operation on the small holding it is, however, essential that the owner shall be interested in forestry, capable, and prepared to devote sufficient of his labour to that end.

Likewise, small-scale forestry provides better opportunities for intensive utilization of the forest yield by taking out a greater range of assortments in the fellings and by using the less valuable timber from the thinnings and the logging waste for farm use, and even for sale, for instance as fuel wood — not always a profitable practice when it is necessary to rely on hired labour.

It is under these conditions that the so-called model forest is achieved. This very term reflects its uncommonness, at least up to the present. It is pertinent to question though whether, in devoting his labour to his forest, the owner of the model forest is not prompted by more than purely economic motives — by the satisfaction derived from the creation of new values, the harvesting of bigger crops from the forest just as from the cultivated land, and lastly by his interest in exploring the secrets of the laws that govern the conditions of growth and the successful development of the forest.

If it is assumed that the intensity of management on small holdings is primarily dependent on the possibility of using only the labour of the establishment — generally in co-ordination with the farming —, the in-

tensity would be greater the smaller the holding. It is, however, generally considered that the smallest woodland is the least efficiently managed, perhaps because the smallest woodlands are as a rule to be found on the smallest farms, which are financially less profitable and which are therefore also most in need of immediate cash return from the forest.

Experience suggests that the intensity of small-scale forestry tends also to fall off for units above a certain area. This would be expected since the intensively managed forest enterprise is assumed to have the advantage of the farm labour, and to use the less valuable timber for household purposes. This has been confirmed by a study performed at the Department of Forest Economics of the Royal School of Forestry of the significance of forest ownership for the economy of the farm. It was shown that the owner's total contribution of work to his forestry operation no longer increases above a certain size of holding — this varying from one part of the country to another, and with the area of the agricultural land. Otherwise expressed, there is a certain size of holding for the optimal exploitation of the farm labour.

It is an advantage, not only from the point of view of the owner but also of the community, that the existing labour should be used to increase the production of goods by intensive forestry in so far as this labour would not otherwise be employed; or in any case not so productively. It should not be deduced, however, that, for this reason, intensively managed small-scale forestry is from the social aspect superior to large-scale forestry in which, in order to utilize the advantages of mechanization and other measures of rationalization, the operations have been concentrated, with a consequent smaller demand for labour and a lower intensity in certain respects. Large-scale forestry has, by its nature, no unexpended labour reserves. Neither would it be possible to compete with industry and other branches of the national economy for the available labour if its efficiency could not be raised by mechanization and other measures of rationalization. The increase in the efficiency of labour in large-scale forestry is in line with the general development in all lines of industry towards increased efficiency. Moreover, the present decrease in labour resources available to the small forestry unit compels rationalization of working methods also on these holdings, whether to economize in the use of their own labour or to be able to afford the rising cost for hired labour.

It has also been maintained that in view of the greater possibility that some small forest owners have for intensive management, large-scale forestry, with a tendency to concentrate fellings and other operations to fewer but larger areas, would be better suited to the large uniform forest tracts of Norrland, while small-scale forestry would be better adapted to the varying terrain of southern and central Sweden.

Even if it is to some extent true that large-scale enterprise, in forestry as in other industries, is favoured by uniform conditions, it should not be concluded for this reason that larger holdings cannot be satisfactorily managed in central and southern Sweden. Evidence to the contrary is found on the many well-managed large holdings in these areas, even in the extreme south. It is, however, essential, if large-scale forestry is to be operated to advantage in these districts, that the forest properties should not be too severely sub-divided.

4. Rationalization and the small holding

The difficulties experienced by the small forest owner in taking full advantage of the possibilities for rationalization are particularly evident in cases where it is necessary to make outlays that cannot be recovered within a rather short period of time by the ensuing decrease in costs. This is especially so in the case of the purchase of expensive machinery of various types. Even power saws may present some difficulty on this account. This problem has to some extent been solved, however, by co-operation between the small forest owners.

Another reason why greater use is not made of mechanical equipment on the small holding is that the owner does not deem it so great an advantage as the large enterprise to replace the labour by expensive mechanical equipment. In so far as rationalization does not provide other productive use of the released labour no advantage will have been gained from the aspect of the social economy either.[1]

It must be stressed, finally, that the proper exploitation of the technical progress today demands more training of forest workers than formerly. If no special measures are undertaken to furnish skilled labour in one form or another to small holdings this shortage will become an increasing obstacle to the application of technical advancements which are already available to the large enterprises. More technically trained personnel will also be increasingly necessary to give advice on rationalization or management measures to be applied in the individual case.

5. The demand for skilled labour

With the mechanization of the forest work and other measures of rationalization the need for *permanent* forest labour with some degree of technical training has become even more acute than in earlier times, when

[1] In order that there shall be some advantage from the rationalization measures, the increase in production due to them should be at least equivalent to the cost of the measures. On the other hand, a measure of rationalization may imply the elimination of heavy labour and an increase in leisure, which are themselves advantages that may be considered to justify the cost of mechanization or other measures, even if there is no actual increase in production.

the production of charcoal was the reason for the employment of permanent forest workers. The production of charcoal is no longer of such importance but the need for skilled labour in modern forestry implies a new demand for permanent forest workers which is evidenced also outside the old mining areas. The increasing need for silvicultural measures and a tendency to extend the felling season has made it possible not only to maintain but also to increase the permanent labour force that can be provided with employment throughout the year. The increasing shortage of labour in the forest districts also has contributed to the rising tendency to engage permanent forest workers. Considerable attention is devoted to the training of these workers by the Government and by the larger forest companies.

The shortage of skilled labour on the small holdings must, as mentioned already, be considered as one of the reasons for the lag in the application of technical development. Attempts are being made to relieve this deficiency by means of training courses for the forest owners in, for example, felling, hauling, and tool maintenance.

The solution to the problem of the local shortage of labour on the small holding is to be found only in some form of co-operation. The common engagement of permanent forest workers to supplement the labour force of the owners has now begun to take form and promises to offer a solution where the conditions for such co-operation prevail. In some counties forest labour gangs have been organized with the co-operation of the local forestry boards and the forest owners' associations, so far mainly for silvicultural work.

6. The cost of raising efficiency

Increased efficiency of production and the consequent decrease in costs, generally speaking, requires the supply of improved equipment — in the form of machinery, implements, means of transport — and increased knowledge of the essentials of production. The first of these requirements has been treated in the section on the rationalization of forestry, with the stress on the mechanization of forest work and transport. The second requirement — increased knowledge — has been implied in the stress laid on the importance of skilled labour and trained personnel.

The cost of the mechanization of forest work and transport tends to rise with the design of new labour-saving machines and means of transport. Clearly, the larger enterprises have means of financing these improvements that are not available to the small forest owner unless he has recourse to some form of co-operation.

Even skilled forest labour and trained personnel involve increased costs. With regard to skilled labour the increased cost is chiefly associated with providing the permanent workers with homes.

It follows from what has been said above that the price to be paid by the large forest owners for the greater technical efficiency derives from the costs of mechanization, permanent labour and trained personnel.

As there has been no full investigation into this matter it has not been conclusively established whether the inclusion of these costs would still show that large-scale enterprise is, also economically, more efficient than the smaller. It may be assumed, however, that these increased costs would not be incurred unless they were economically justified. Thus, the costs involved by permanent labour and trained personnel should be taken into account when calculating the economic advantage of the various mechanization projects and silvicultural measures. As far as the cost of trained personnel is concerned, it is easy to imagine the difficulties facing the forest concern that does not engage such personnel. However, the question in this case is not whether or not such personnel should be engaged but of how far it is advisable to go.

Large-scale forestry has, however, to hear the overhead expenses arising out of the employment of hired labour, which involves some supervision and the cost of checking the output. These expenses need not be incurred by concerns using their own labour, as is generally the case on the small holding. Even here, however, the trend towards the increasing employment of hired labour and the sale of stumpage is marked.

The small owner, unlike the large concern, has moreover no great expense for trained personnel or administration. The expenses of the small holding will, however, increase according to the extent to which the small owner seeks to utilize the advantages of mechanization and technical knowledge through various forms of co-operation. The cost of local forestry boards and of the forest owners' associations should, in fact, be considered as such expenses, although they are not directly paid by the small forest owners.

Finally, it should be observed that the costs should not always be calculated in the same way from the public point of view and by the private enterprise. In order to make this clear we will illustrate this with an example, using for this purpose the cost of permanent woods labour.

This cost is primarily made up by the cost of housing. Although a certain rent for this is charged by the forest enterprise, this rent is so low that the cost of permanent labour is a rather big item in the large forest concern. For this reason it is generally maintained that the small forest owner in this respect has an advantage over the large concern.

First should then be mentioned that is is generally held that small-scale forestry should be charged with part of the cost of housing and other buildings on the farm, i. e. to the extent that these are used by labour and horses when they work in the forest.

Against this could be said that when housing and other buildings are

primarily maintained for the purpose of farming there should be no reason to charge forestry for more or less of the ensuing costs. Only the increase of costs that possibly is caused by the employment of men and horses in forest work should in such a case be charged against the forestry end of the enterprise.

This refers to the financial way of looking at the costs. From the public point of view the cost of housing should not be treated as a cost of production but as an item of consumption. The forest worker shall at all events have a house to live in. Moreover, if in the large concern the forest worker nowadays can generally enjoy better housing than on the farm the cost of this should not be reckoned as a disadvantage of large-scale forestry. From the social point of view it should even be credited to large-scale forestry.

7. The consolidation of holdings

An essential condition for the full exploitation of the advantages of large-scale operation is that the forest area belonging to the individual enterprise be sufficiently concentrated. The sub-division of a forest holding into scattered plots, often of incovenient shape, is a great obstacle to the realization of measures for increasing the efficiency, whether these imply the mechanization of forest labour and transportation or the employment of permanent labour and trained personnel.

This question is one of the most important in Swedish forestry today. The situation in this respect leaves much to be desired. The best structure of the operational unit is found in the State forests, which are mostly in large holdings. Conditions vary as far as the company forests are concerned. Since these forests, chiefly in Norrland and Dalecarlia, have been obtained by the acquisition of farm woodlands, the structure of the holdings is often rather less satisfactory. This problem recurs in the farm woodlands where the sub-division into narrow inconvenient strips through inheritance has occasionally gone so far that rational management is no longer practicable.

The disadvantages of the sub-division of property are most evident in the large holding for which the expenses of trained personnel and permanent labour thus are increased. At the same time it becomes more difficult to concentrate fellings and silvicultural measures for exploitation of the advantages of mechanization and the economics of transportation. The inconveniences involved by sub-division may, however, also be considerable in the case of the small holding. Moreover, the drawbacks tend to increase with the degree of mechanization and the increasing cost of labour and personnel. Since, by virtue of the existing forms of ownership, the total size of the individual holding may generally be regarded as fixed, a con-

centration of the scattered plots into more consolidated working units by an interchange between the different forest owners would be the chief means of countering the adverse effects of this situation.

Such adjustments have lately been made between the Government and the forest industries and among the forest industries themselves. It is highly desirable that this practice be extended to the farm forests; this may well be facilitated by suitable legislation as well as by revising existing laws.

III. Co-operation between small forest owners

From the above argument it may be inferred that in forestry, as in agriculture, the efficiency is lower on the small holding than on the large. However, a factor of relevance which has been mentioned only in passing is the possibility of co-operation between small units. This co-operation has assumed different forms in different countries. It would appear that Sweden holds a leading position in this respect.[1]

Foremost in time and in importance is the co-operation involving trained personnel in silviculture which came into being on the public initiative through the establishment of the local forestry boards in 1905. There has been abundant evidence of the achievements of the boards in promoting silvicultural measures on the farm woodlands where they previously had not been practised. In view of the fact that the farm forests comprise the most fertile and best situated part of the forest area, the significance of silviculture on these lands cannot be overestimated.

The local forestry boards have not only furnished personnel trained in the planning and supervision of the forestry measures; they have also, through widespread dissemination of information, aroused the interest of the forest owners in forestry, and, by providing educational facilities, have tried to impart to them the elementary principles of silviculture.

Another activity, this on the initiative of the forest owners themselves, is represented by the forest owners' associations. From their original role of serving as a sales organization, they have gradually extended the scope of their activities to the rationalization of felling and haulage. By means of information services they are trying to promote interest in the economic laying off of the felled tree into log lengths, in efficient tool maintenance, and in proper storage of the felled timber. As regards mechanization, there are, for instance, demonstrations of new machines to the forest owners. In the case of the more expensive equipment such as tractors for road-building, the associations occasionally act as machine depots.

However, the disadvantages of the small holding cannot be entirely offset

[1] Finland also shows an interesting development in this field, whereas Norway rather follows the Swedish pattern.

by co-operation. The various operational units still belong to different owners, which implies that the measures on the ground are still essentially bound to the small units. This obstacle cannot be completely overcome by co-operative management. Above all it constitutes a hindrance to profitable mechanization. Other disadvantages include a relatively high cost of trained personnel. For this reason, too, it is desirable to get the forest-owners themselves actively engaged in the forest work. There are occasions when co-operation is, however, essential if the measures are to be introduced at all — as in the building of forest roads and drainage work in which several owners often must participate.

The difficulty generally inherent in the small enterprise in keeping up-to-date with research and applying the findings without delay is evident also in forestry; here it is to some extent offset by the information service that is run by the local forestry boards and the owners' associations. There still remains, however, a considerable degree of inertia to be overcome in the application of the results of technical developments as well as of research in silviculture to the small forest unit. These advances are not always readily applicable to the small unit so long as it lacks the trained personnel and the skilled labour required to exploit them to the full.

The reservations made above relating to the possibilities for improving efficiency of the small unit through co-operation should not obscure the fact that this co-operation has been of great importance in counteracting the major disadvantages inherent in the small size of the holding.

The fact that not all owners of the smaller forests avail themselves of the services of the local forestry boards or are members of the forest owners' associations, which now cover about one half of the forest land under farm ownership, should obviously not be allowed to detract from the importance of this co-operation in principle. This importance will increase with the technical progress, which tends to accentuate the disadvantage of the small units, and also in view of the wider possibilities that forestry research opens up for the forest owner who is in a position to avail himself of them. The task facing the small forest owner is therefore to proceed still further on the road to co-operation. It is important, however, that this should not weaken the initiative of the individual forest owner and the interest in managing his own forest, which should, in fact, be considered the most valuable asset of the small forest enterprise. This interest can best be promoted by providing the small owner with better facilities for acquiring knowledge of the management of his own forest.

IV. The influence of the form of forest ownership on policy

1. General aspects

The form of ownership exerts its influence on the forest policy of the owner, and hence on the economy of his forest enterprise, in virtue of the fact that the forest land is a part of the owner's property, and as such its management is dependent on the principles according to which the proprietor runs the enterprise as a whole.

The principles of business economics require that an enterprise, whatever its kind, be managed so as to give the greatest margin of income over the cost for the means of production that are engaged for this purpose. This is equally true of forestry as an economic enterprise.

When forestry is integrated with other activities this principle should govern the management of the enterprise as a whole. The first question arising in such an enterprise is related to the most profitable distribution of investments.

In theory, this finds its answer in the above-stated principle of business economics. The disposal of the available resources — and hence eventually also the planning of long-term investment — should aim at ensuring the greatest surplus of income over costs for the enterprise as a whole. The problem of distribution of investments may then be expressed as the attempt to utilize the resources in the manner that will result in the best financial result for the enterprise as a whole.

In the distribution of the investments it must be borne in mind that the various branches of the integrated enterprise are generally to some degree interdependent. This interdependence assumes various forms. Where forestry is conducted in association with the wood conversion industry the latter is more or less dependent on the supply of raw material from the forests, although some of the material may be, and usually is, purchased. In forestry integrated with agriculture the farmer can, of course, buy the timber required for household use — including fuel wood —, but it is undoubtedly an advantage to be able to obtain it from his own woodlands.

The interdependence of the various branches of the enterprise may also have its origin in the common use of some of the concern's facilities. In this way they may be better exploited than if each branch were conducted independently. This must obviously be to the advantage of the enterprise as a whole, especially where the shared facilities are of a more or less fixed nature — for example, the apparatus of administration, and arrangements for handling welfare and labour relations, etc. In the discussion on land policy great importance has been placed on the sharing of labour in the forest and the farm. On the other hand, the common use of woodland — for forest grazing and timber production — has with the rising value of

timber turned into an increasing disadvantage not only for forestry but also for the economy of the enterprise as a whole.

The advantages which may be derived from integrating forestry with some other activity constitute one of the main reasons for the great extent to which such integration has in fact been realized. Almost one half of the forest land in Sweden is integrated with agriculture, and one quarter with the conversion industry. The remaining quarter consists of public forest land.

This distribution of forest ownership should be seen against the historical background of the importance placed on the ownership of forest land. Thus, possession of land by the conversion industry has its origin in the acquisition of forest to guarantee the supply of raw material to the forest industry, first as a safeguard against a fall in market prices, and later also as a long-term guarantee of the increasing investments in plant and other facilities by reducing the dependence on purchased raw material.

There is today practically no large industrial forest enterprise that does not have its own forests which can supply at least a part of the required raw material. Experience has shown that the conversion industry — at least in Sweden — cannot be run on rational lines and on a long-term basis without being able to rely on its own forests for a considerable part of its raw material. This has been all the more evident as the industry has met with growing difficulties in its purchase of roundwood which to an increasing extent must be made from strong forest owners' associations.

The ownership of forest land by the agricultural population developed as a natural consequence of the exploitation of the forest for grazing, for the grass growth from the moorlands, for fuel wood and for house building, and for hunting and fishing. With the rising value of timber, however, the importance of the forests for the agricultural population has come increasingly to rely on the income yielded through the sale of timber, as the yield of the farm forests is usually only to a small extent required for the farm, and through the earnings from felling and hauling the timber sold.

Government ownership of forests in Sweden, as in other countries, has its origin in the fact that from early times the Government declared as national property the forests and other natural assets that had not already been claimed on the grounds of use or possession by the agricultural population. This was evidently with the purpose of ensuring a steady income for the Government, all the more desirable as the land at that time was a main source of income for the community. This explains also why the State forests are located primarily in northern Sweden, and centred on the sparsely populated Lapp territory. Since the end of last century, however, the Government has also bought a considerable area of forest land in southern and central Sweden.

Just as the form of ownership determines the policy for forest management, so it also determines, above all, the investment policy in each of the forms of forest ownership discussed. Thus the industrial forestry enterprise is characterized by the need of the associated industry for raw material; the farm forestry by the integration with agriculture; while the State forestry is influenced by the social interest, as well as by the financial interest of the Government to derive a high income from its forests.

However, the ownership also gives rise to individual variations from the general policy for the particular forms of ownership. These deviations, which are readily apparent, are dependent on such conditions as the owner's financial status, his need for money, the opportunity he may have for choosing between alternative investments, and his general competence and technical knowledge. This is equally true whether the owner is an individual or an enterprise.

State forestry

The forest policy for the State Forests is the most consistently carried through. These forests are all under the same management and the forest policy has been decided on by resolution of the Riksdag (Parliament). According to this policy, as it was laid down in a decree of 1935, the forests under the administration of the Forest Service shall "be managed so as to ensure the highest yield in money compatible with a sustained and, as far as possible, even yield".

This policy is clearly in line with the first object of the Government — to assert its claim to forest land in order thereby to ensure a reliable source of income. As it is defined here — the highest yield in money through sustained-yield management — this policy aims at a long-term guarantee of the highest income. This policy, if strictly followed, would mean investment in silvicultural measures and growing timber that would be carried beyond the economic limit; that is, a point might be reached where further investments in forestry might be less profitable than investments elsewhere in the national economy.

Although the State forest policy, thus defined, largely coincides with the interest of the community, it does not admit of any balance between the investments in forestry and in other lines of activity. However, this policy is not strictly followed, as it would obviously lead to uneconomic investments; and, moreover, even the Government does not command unlimited funds to tie up in its forests in order to ensure a maximum long-term monetary income.

It is also natural that the Government, as the representative of the public

interest, should use its forest resources as a means of meeting certain social requirements that are not in accordance with its forest policy as stated above.

Industrial forestry

With regard to the company forests — or industrial forests as they are better called — the policy is rather well-defined, although not as consistently pursued as that for the State forests. The aim is to guarantee a supply of raw material for the associated wood-conversion industry — in times of economic depression as well as in the longterm. The need for supplying the industry with raw material in times of economic depression, when it is difficult to pay for it, makes it important to keep up fellings from the owner's forests rather independently of changing market conditions, in spite of the fact that, to obtain the highest net income from their forests alone, it would be better to increase the cut in peak years, when the price of raw material is high.

In order to guarantee a long-term supply of raw material and thus to avoid idle capacity, the enterprise as a whole should be justified in making greater investments in measures designed to increase over-all production — such as from a more intensive forestry — than would be profitable from the forestry aspect alone. It is, however, difficult to distinguish between those measures for increasing productivity that would aim at avoiding a future shortage of raw material and those that from a general standpoint would simply increase the supply of raw material, inasmuch as this may reduce the dependence on the raw material market or would make possible the enlargement of the conversion plant, with subsequent reduction in production costs. In either case an increase in the yield of raw material from the forests to some extent benefits the enterprise as a whole, which can warrant greater investments in measures intended to increase and adapt the production of raw material according to the needs of the integrated industries than would be the case from the point of view of the forestry enterprise alone. This is an important aspect of the combined enterprise and should clearly be borne in mind by those responsible for the distribution of investments between the various branches of the enterprise.

The present-day attitude of the Swedish forest industry to investments in silviculture may be illustrated by citing the closing words of Dr. Erik Kempe, the head of Mo & Domsjö A.B., on the occasion of the visit of the Norrland Forestry Association to the estates of that company in 1954. "Let us aim at the highest possible yield from our forests, irrespective of the species but with some regard to the quality of the timber. The problem of the best and most profitable use of this yield may safely be left to the chemists

and wood technologists. If we proceed along these lines we run the least risk of reproach from our successors".

According to this statement, which would probably be endorsed by other representatives of industrial forestry in Sweden, forest policy for this form of ownership should envisage the greatest yield of raw material for the forest industry but with some consideration for quality. The policy implied herein does not take into account the cost of attaining the highest yield of raw material, which could hardly be neglected in practice. Nor does it take in account the alternative cost of buying raw material, as the quantity available in the open market is considered fairly independent of the price in the long run. The statement should thus be regarded as a declaration of principle, which in general terms stresses the importance of aiming at the greatest yield of raw material as the policy of industrial forestry. There should then be no real conflict between this declaration and the policy which, according to general principles of business economics, should be applied to industrial forestry, namely: in co-ordination with the conversion industry, to aim at the achievement of the best financial result for the enterprise as a whole.

Farm forestry

A forest policy in the true sense of the term has not been formulated for this category of forest ownership. On the basis of the principles applied here, the policy for the farm forestry should be: in co-ordination with the other activities of the owner — primarily agriculture — to effect the best use of the common resources and thereby to achieve the highest income to their owner from the available resources. This presupposes the full utilization of all the resources — the agricultural land, the forest and the labour — the labour being suitably distributed between the agriculture and the forestry.

The combination of farming and forestry has been considered of value chiefly because it permits more complete exploitation of the labour force — manpower and draught animals — than does agriculture alone. As a result of this, the common ownership of agricultural land and forest originally based on forest grazing and hunting has been maintained through legislation — except for a short period at the end of the last and the beginning of the present century, when the dividing of the land was free — even after these early forms of utilization had lost their significance. The woodland has, through this legislation, come to be considered as an indispensible supplement to agriculture, especially in the more densely wooded parts of the country, with their smaller and less thriving farms. As it is, the woodland provides not only a more complete use of the farm labour, but also a source of income from the forest yield.

The social aspect is dominant in the final stage of this development, which

has resulted in the political movement to supplement the so-called »incomplete farms» with forest land when they could not be supplemented with agricultural land — often a difficult matter in the wooded parts of the country.

V. The influence of the form of ownership on investment in forestry

1. General aspects

As has been shown above, forest policies for the various forms of ownership should be defined according to the general principle that forestry shall, in conjunction with other integrated activities in the same enterprise, contribute to the achievement of the best financial result of the enterprise as a whole. This means that the utilization of the forest resources — and in the last resort also the investments — should be adjusted according to the income that these investments will yield for the enterprise as a whole, in comparison with other possible alternatives of investment. This has been shown to vary from one kind of ownership to another.

The investments in a forestry enterprise which is integrated with other activities will depend to some degree on the investments which are considered necessary or desirable to these other branches. This necessity for choosing between different alternatives of investment is particularly evident when the sum available for investment purposes is limited, and independent of the choice of alternative investment. The sum available for investment over a certain period may, however, generally be varied to some extent, partly by using credits (raising loans) and partly by varying the portion of the current income taken out of the business — say, for the payment of dividends, delivery of the surplus from State forests to the Government, current consumption, or saving, as for instance by deposit in the bank (particularly from farm forests). Where the use of borrowed funds for forestry constitutes a clear alternative to investment in forestry, the interest on the loan will be important in deciding the suitability of investment, since this should be placed on the debit side. As for the choice between consumption and saving having a bearing on investments, this choice is a personal one which is of particular significance for the farm owner, since the income from the forest is an important supplement to that from the farming. If the forest owner in such a case chooses to save, the investment in forestry should give at least the same yield as other available alternatives for placing the savings, taking into account the factors of security and the possible depreciation of money. However, the lack of ability on the part of the small forest owner to judge alternative investments will greatly restrict his choice of such investments outside of the farm.

In a discussion of the investments of the forestry enterprise the rotation is also a factor to be observed since this largely influences the amount of capital tied up in forestry, as to a lesser degree does also the method of thinning. This is particularly apparent in the heaviest forms of thinning that result in the removal of the biggest and most valuable stems in the stand.

In the last instance, in order to evaluate and compare the various alternatives of investment it is, according to the foregoing discussion, also necessary to take account of and, as far as possible, to assess the benefits to the enterprise as a whole derived from a certain investment in forestry.

2. Industrial forestry

It has been shown that the policy for the industrial forest enterprise shall be to co-ordinate the management of the forest land and conversion industry so as to ensure the best financial result for the enterprise as a whole.

The benefits implied by the guaranteed supply of raw material from the forest to the conversion industry are approximately represented by the conversion profit — properly speaking, at the future time when the yield of a certain investment in forestry is available as raw material for the industry[1] — and in the greater independence of the market for roundwood. These benefits are difficult to evaluate in monetary terms, however.

In a calculation of the investments in silvicultural measures the benefits should, then, logically be capitalized or placed on the credit side to the value that they represent to the enterprise. The uncertainty of the evaluation of the benefits implies a wide margin for the subjective assessment. This, however, is a feature that is characteristic not only of forestry, but may also occur in other forms of investment.

An important consequence is that in industrial forestry it would be worthwhile investing more in reforestation, for example, than would be indicated by an economic calculation solely for the forestry side of the enterprise.

However, we have now entered a field of very vague calculations where therefore further outlay would more be in the nature of a measure of consolidation or an insurance premium against future shortage of raw material than an investment in the ordinary sense of the term. Accordingly, it is probably more likely that the management will judge the prudence of such an investment on the basis of the increase in the cost of the finished products. It will then generally be found that this increase in the price is small compared with the total cost and with the market price. On the other hand the investment must be made a long time in advance.

[1] In the profit from conversion is included the share of the marginal production in the fixed costs of the enterprise, both in the forest and in the industry. This means that one can reckon with the net value of the marginal production after deduction of the variable costs in the forest and the industry.

Moreover, there is constant competition for funds available for investment, especially for rationalization measures in the allied industry which yield a more immediate return and which are of a more urgent nature. This constitutes a dilemma for the industrial forestry enterprise. With the higher net income of the post-war years the shortage of labour and reforestation material have prevented the full exploitation of the financial possibilities to increase silvicultural measures.

The investments for increasing the quality of the timber will depend on the influence that it is judged to have on the quality and price of the finished products at the future time when the stand is cut, which, by the way, will also be reflected in the future prices for different qualities on the roundwood market. It is interesting to find that there is no appreciable incompatibility between a high quantitative yield and a high quality of the timber. However, a high quality may also involve certain additional costs — for instance, for pruning. A certain conflict may also arise between the demand for high quality and financial profitableness, as, for example, heavy thinnings may impair the former although, up to a certain point, they may increase the latter.

The rotation in industrial forestry would be chosen, it would seem, to give the greatest production of raw material for the associated conversion industry.

However, here too it is not possible to disregard the cost of producing the raw material. Since the cost — and especially the interest — is dependent on the rotation, calculation of the rotation must take into consideration the rate of interest. Consideration of an industry's need for a dependable supply of raw material should in principle be observed by fixing a higher price for the assortments that the industry needs than the prevailing market price; in fact, a difference corresponding to the greater value placed on these assortments in the enterprise in virtue of the guaranteed future supply of its raw material. An approximate estimate of this additional outlay is given by the expected conversion profit for those assortments, especially where there is a future shortage of raw material. This means that the prices so adjusted for the various products will still fulfil the traditional purpose of the price — to guide the production in the most economical direction, while taking account of both the cost of producing a certain raw material and of the advantage that this production implies for the integrated industry. For a moderate interest of 3 to 4 per cent the difference in the rotation so reckoned, and on the basis of the highest yield of raw material, should not be of any great importance. There is further the advantage of the greater independence of the roundwood market implied in the access to raw material from the industry's own forests, an advantage that can be evaluated only subjectively.

In view of the difficulty of evaluating these benefits in monetary terms and the fact that the costs — mainly the interest for the growing stand and woodland — are also difficult to estimate, it is understandable if in industrial forestry the problem of rotation is simplified to the consideration of the dominating item — the greatest yield of raw material for the integrated industry.

This means that a sawmill enterprise with its own forests may find it to its advantage to maintain a longer rotation than a pulp-producing concern. This is an application to the sphere of long-term investment of the principle that is the basis of the laying off into log lengths in the industry's own forests, account being taken of the industry's immediate need for different assortments by debiting them only with the variable costs of the industry.[1]

However, where a calculation would point at a change of the rotation, the consequences of this change must be taken into account in the final analysis. This is of particular importance in the case of prolonging the rotation to increase the production of raw material. Where the supply of raw material during the transition period is decreased the inconvenience involved must be taken into account.

3. Farm forestry

According to the foregoing analysis, the policy for the farm forests should largely be determined by the advantage of exploiting to the full the labour source common to farming and forestry, it being assumed to be in the interest of the owner to derive the highest income in the long-term from the available resources. This policy should then also be reflected in the amount of the investments and their distribution between agriculture and forestry in the enterprise.

The distribution of the labour between the farming and forestry is largely governed by the fact that the greatest demand for the available labour by these two branches of the enterprise falls at different seasons of the year. This applies primarily to the felling which requires the major part of the labour in the forest. The silvicultural operations, however, are predominantly performed during the agricultural season and consequently compete with the farming for the available labour.

The labour spent in felling operations represents no investment, but it is important on account of the immediate return that it provides for the forest owner. It seems generally acknowledged that there is an increasing tendency to use hired labour for the felling of the timber to be sold. No exhaustive study has been made on this point but the amount of such timber

[1] This is only an outline argument. In fact, in laying off the logs for cutting, a combined industry must take into consideration sales effected, the prospects for the various products on the market, and similar factors.

felled by the owner's own labour has been put at no more than 75 per cent on an average, although this varies considerably for the individual holdings and depends upon a number of factors.

The most important reason for the use of hired labour lies probably with the reduction in farm labour. Again, the easy way in which an income may be obtained from the forest by selling of stumpage tempts the forest owner to save himself work and trouble, provided that he does not contract for the felling or haulage even in such cases. The considerable post-war increase in stumpage prices in relation to other utilities has made it less necessary than formerly for forest owners to undertake the heavy felling work, especially in view of the high marginal taxation to which even the income from work is liable. That now, as earlier, many forest owners are not in a position to perform the felling themselves does not in itself involve a change.

The advantage of using the farm's own labour for felling should tend to even out the annual cut in the farm woodlands. This trend is, however, counteracted by a natural tendency to adapt the fellings to the variations of the timber market, in marked contrast to the practice in State and industrial forests, where the annual cut is more even from one year to another.

The use of the farm labour for investment in silviculture will, as already mentioned, meet with a varying degree of competition from the farm. Accordingly, it would appear that the smallest farms would have the best opportunity of supplying labour for silvicultural work, but this is hardly borne out by experience.

As the ordinary silvicultural operations on a medium-sized farm forest of 100 to 150 acres will require only a few days, it would be chiefly the owner's personal interest in forestry that would eventually determine his investment of labour in that side of the enterprise. This explains in some degree the wide variation in the standard of silviculture on the farm forest. In addition, the need for using the income from the forest to meet current expenses and for investment in the farm enters the picture as another restricting factor of varying importance. Consequently we find in the farm woodlands all stages of silviculture — from the model forest to the enterprise that fulfils the bare requirements of the forest law. There would be even wider variations if the forest law did not stipulate a certain minimum investment in forestry, with respect to both silvicultural measures and the growing stand.

As regards the distribution of the investments between farming and forestry, whether in the form of labour or money, it is probable that agriculture gets the greater share in relation to the marginal profit. In principle then, the investment of labour should be adjusted so that the marginal productivity, taking into consideration the time factor, should be the same

for agriculture as for forestry. A certain transfer of investments from farm to forest, chiefly in respect of labour, would evidently be justified. This, however, encounters the difficulty that the owner is generally dependent on the immediate income derived from agriculture. This could also be expressed thus: that the owner cannot afford to apply the long-term view to investments in foresty that would make them competitive to investments in agriculture. On the other hand, there is in fact a transfer from the agricultural industry as a whole to forestry — chiefly in the form of land — through the gradual abandoning of the smallest farms in isolated localities, and their conversion to forest.

The rotation in the farm forests where there is a surplus of labour may well be chosen so as to promote more liberal use of the labour; that is to say, primarily for the felling of the harvest. This would mean that the rotation would tend to some extent towards the highest yield of wood, but above all favouring assortments involving a greater expenditure of labour — reckoned per cubic unit —, and thus smaller assortments such as pulp wood. In a calculation of the rotation this would be effected by not counting the cost of labour for felling at a higher price than that corresponding to the utilization of the labour for the most profitable alternative purpose, so that the assessed stumpage value of the smaller assortment would be increased in relation to the bigger, such as saw logs.

This, however, is only a theoretical conception, as the rotation in the farm forest is hardly to be determined by such long-term considerations, quite apart from the fact that calculation of the rotation is not made at all by the farm forest owners. Moreover, the surplus labour in winter time, too, is not as great as formerly. Under such conditions there is no reason for chosing any other rotation in the farm forestry than that determined by the prevailing or, more correctly, the anticipated stumpage prices for the various assortments. Neither is any tendency towards a shorter rotation, with pulp wood as the main produce, justified on these grounds.

In fact, the cut and thus, indirectly, the volume of the growing stock and the rotation are determined mainly by the owner's need for ready money, partly to supplement the income from agriculture for the upkeep of the family and, if possible, some improvement of its standard of living, and partly for investment in the farm. This includes, above all, the maintenance of buildings and expenses for new buildings, agricultural machines and implements. A large portion of the costs for the rationalization of the farming — for instance, through the purchase of tractors — will probably have been financed by the income from the forests.

The growing stock which will consequently be found on the farm woodlands and the corresponding rotation vary widely from one owner to another. The poor financial status of some of the forest owners is reflected in heavy

cuts, whereas the thrifty disposition of other owners is expressed in the saving up of a large volume of timber. This, too, is hardly sound economic practice when it is carried too far, for no definite purpose, and when there is an opportunity for more profitable investment.

It might be mentioned that in southern and central Sweden the growing stock on the farm woodlands is on the average — although varying from one part of the country to another — somewhat lower per acre than in the industrial forests, when account is taken of the difference in site class.[1] The national forests have a somewhat higher growing stock. The heavy taxation of income from fellings appears also to be tending to reduce the cut in the farm woodlands.

It may be recalled that the late Professor TOR JONSON, in a paper entitled "Some aspects of the economics of farm forestry», read before the Swedish Forestry Association in 1930, discussed the rotation on farm woodlands. JONSON considered that farm forest owners, on account of their almost permanent shortage of capital, could not make as great investment in the growing stock as the large forestry enterprises. Since the farm forest may, according to JONSON, often be operated with advantage more intensively with respect to labour than the large forest, he held that the farm forest, in order to attain the same economic effect, need not be managed as intensively with respect to capital — that is to say, with the same rotation as that applied to holdings where hired labour is employed. Especially since the pulp industry became a great consumer of small timber, it may well be considered that farm forestry would aim chiefly at the production of pulp wood rather than of saw logs, which at that time were the chief assortment in large-scale forestry.

However, the question of shortage of capital is not associated directly with the form of ownership since it can occur also in other categories of forest than the farm forests. Besides, this statement referred to the low growing stock in the farm forests of southern and central Sweden at that time — about 25 years ago —, while there has since been a considerable increase of the growing stock on these farm forests. However, the principle question remains: whether the shortage of capital can be compensated by increasing the investment of labour in farm forestry.

It is natural and correct to invest more of the resources of which there is a surplus than of those of which there is a shortage. It may also be assumed that an increased investment of labour into silvicultural measures may wholly or partly compensate for the loss of production consequent on short rotation and too low growing stock. On the other hand, it must under all

[1] According to the second national forest survey, the growing stock on the farm woodlands in Norrland was on an average of the same size as on the forests of the industrial companies. The data on Norrland are, however, now 10 to 15 years old and consequently may no longer be valid.

circumstances be considered as a disadvantage, especially from the public aspect, if a poor financial situation is allowed to prevent profitable and desirable investment in forestry, whether in the form of silvicultural operations or growing stock. From the public aspect a shortage of capital or a poor financial situation cannot be accepted as justification for a shorter rotation, whoever owns the forest. This point has been confirmed by the 1948 Forest Act which specifies certain minimum investments in forestry with respect to both silvicultural measures and rotation.

4. State forestry

The official policy for the State forests is, as mentioned above, to ensure the highest return in money compatible with a sustained and, as far as possible, even yield.

This policy implies in principle that there is no demand for interest on investments, including interest on the value of the growing forest. In the case of silvicultural measures this principle leads to considerable investments — actually to the point where the profit on the marginal investment is nil.

Applied to the rotation, this principle for the same reasons leads to very long rotation periods, possibly 130 to 140 years in central Sweden — and to the accumulation of a large and valuable growing stock. These long rotations mean the setting aside not only of the interest claim but also of the policy of a maximum yield of raw material. It is to be observed here that the Government also, in its own industries, converts a considerable part of the cut from the State forests.

The policy in question, while being in the main compatible with the public interest in safeguarding future means of support for society as a whole, does not admit of balancing the investments between forestry and other activities, which should also be in the public interest. In its application, however, the policy for these forests in Norrland may similarly serve the purpose to ensome account of the interest factor, apparently more or less prompted by the fact that even for a State enterprise the financial resources are not unlimited.

A more immediate consideration of the public interest is also reflected in the policy of investment for the State forests. Thus, the extensive investments in regeneration in northernmost Norrland are probably at least in part undertaken on account of the dependence of the local population on the income from working in the State forests. The more conservative felling policy for these forests in Norrland may similarly serve the purpose to ensure a long-term supply of raw material for the conversion industries. Similarly, the Government offers also in periods of depression the same

quantities of timber for sale from its forests to facilitate as regular employment as possible to the local population and in the forest industries.

The State forests should be administered as a commercial undertaking and consequently in accordance with the principles of business economics, whereas the principles laid down by the Riksdag (Parliament) imply a financial policy that would require investments to be carried on to the point where the marginal profit is nil. Eventually, considerations of national economy and of social aspects compel departure from both these sets of principles.

VI. Forest policy and public interest

In order to judge the forest policy of different categories of owners it is necessary first to make clear how a forest holding should be managed solely in the public interest.

The public interest has one economic and one social aspect. From the *national economic* standpoint forestry should be managed in co-ordination with other branches of the national economy so as to ensure the highest national income in the long term.

It is clearly difficult to formulate a concrete policy on this basis for forestry as a national enterprise. Certain conclusions may, however, be drawn concerning the forest policy consistent with this general principle.

First and foremost the resources invested in forestry should provide at least the same contribution to the national income as they would if utilized for other purposes in the national economy. This implies among other things that efficiency must be maintained in forestry just as in any other area of the national economy if forestry is to be able to compete in the long term with these for the available resources — the labour, land and capital. On the other hand there may be resources that can be utilized to greater advantage in forestry than in their present use in other branches of the national economy. In this respect the way the boundary is drawn between agriculture and forestry with regard to the use of the land and labour could well be disputed.

Further, it is necessary to observe that the various branches of the national economy cannot be considered separately, as they are to varying degrees interdependent. In the various stages of conversion from the raw material to the finished product the stream of utilities produced in the community passes through various branches of industry, and it is important that the stages in the production apparatus should be closely co-ordinated, and that the supply of raw materials and other movable resources should not be subjected to marked disturbances, with consequent losses due to idle capacity. This is particularly true of the supply of wood as a raw material

which, during the course of its conversion, increases in value on an average four times its stumpage value.

In considering different branches of the national economy as integrated parts of this economy it is also important to observe that much of the apparatus of production in the community is used jointly by several sections of the national economy. This is the case with, for instance, the transportation system, the superstructure of administration, the judicial system, social welfare, education and defence. These must be financed by the total production of the community and may therefore be regarded as a fixed cost for the community, remaining even when there is idle capacity or other disturbances. The ensuing losses and inconveniences may have serious consequences not only for the population immediately affected but also for the financing of the community functions in the districts concerned.

Our national economy is not isolated, however. For the full exploitation of its resources it is dependent on trade with other countries. It is desirable that the export of forest products should provide ample means of support for the population dependent upon the forest industries; but it is also important that these exports should provide the opportunity for importing not only such consumers goods that cannot at all or to an advantage be produced in Sweden but also the basic supplies needed for our national economy, such as raw materials, fuel and machinery.

In short, the economic aspect of the public interest calls for a steady and as full utilization as possible of the total resources of the community, realized through the full employment of labour in optimal combination with all the productive agencies in the community. This means — for forestry — that all disturbances of employment and production that may occur in the community when there is a fall in the forest yield must as far as possible be avoided. To this end it may be justified to make certain sacrifices — for instance, by holding over an old stand of timber to ensure an even yield of raw material or else by meeting the cost of regeneration or other measures for promoting production beyond the limit of profitable investment judged from the standpoint of the forest enterprise alone. In fact, to take the argument a step further, from the standpoint of the community the investments in forestry measures may even be carried somewhat further, not only in order to prevent a fall in the yield but to increase it, by virture of its general importance in safeguarding the employment, and hence the maximum future output in the national economy.

The private enterprise, which is more adaptable to such changes in the raw material supply than the community, need not to the same extent be affected by a future fall in the forest yield. It can release movable resources — primarily labour — for which it cannot find profitable use. Even for the private enterprise, however, such adaptation will be more difficult the

more fixed are the means of production which are dependent on the forest yield, especially in the form of expensive manufacturing plants. The private concern may then also find it expedient to invest greater sums to maintain the forest yield than would be justifiable solely from the aspect of forestry.

From a policy concerned with the economic aspects it is not a wide step to another aspect of the public interest — the social.

There are two respects in which the *social* interest is particularly evident. The first is related to the attempt to guarantee the *future* provision for the population by sacrifices in the nature of investments for a more or less distant future which are not always made with the financial profitability as their main incentive, but rather to provide for coming generations. Secondly, the social interest is expressed in measures for the *re-distribution* of the national income with a trend towards equalization — either directly through such measures as the progressive scales of income taxation, through allowances and benefits, or by regulating production and hence, to a certain extent, the distribution of income. The social aspect of these measures may even be reflected in a certain reduction in the maximum national income that might have been arrived at by some alternative investment. This reduction can then in principle be regarded as the price the community must pay for the achievement of the social objectives, even if this price cannot be calculated in monetary terms.

As regards forestry, provision for the coming generation is a foremost consideration. It is easy to understand that this branch of the national economy, important not only for the present but also for the future maintenance of a large segment of the population, has been the object of public interest and diverse measures so as to guarantee and, if possible, further increase the forest yield. Sustained yield has therefore become the leading principle of the forest policy of the community, not only in Sweden but in most other countries where forests are of any importance. Different ways are being tried for realizing this policy. Legislation is the main instrument, and then there is education and various forms of assistance to the small forest owners, primarily by the furnishing of trained personnel through local forestry boards, which now is practised in most countries having an active policy.

The expenditure of greater sums on silvicultural measures on the State forests than can be justified solely from the economic aspect of the public interest — as seems to be the case in upper Norrland — can be regarded as a social measure aiming at the present and future provision for the population dependent on the forests. This may also be quoted as an example of the re-distribution of the national income by influencing production so as to provide for a certain group of people living under unfavourable circumstances. Of the various possibilities of providing for this population

this has been considered the best. The social purpose too, then, should be realized by choice of the alternative that is at the same time the best from the aspect of the national economy.

VII. The suitability of different forms of forest enterprise from the standpoint of public interest

As previously stated, the public interest so far as forestry is concerned has an economic and a social aspect. The problem of the extent to which the various forms of forestry enterprise are conducted in the public interest will be dealt with in this chapter primarily from the economic viewpoint; this includes the aspects of efficiency and policy (investments).

1. Efficiency considerations

The significance of the form of enterprise as it affects efficiency has been shown to be reflected chiefly in the size of the holding. It has also been shown that better conditions are provided by the larger than by the smaller enterprise for increasing the efficiency by rationalization (mechanization) of the forest work and by using skilled labour and trained personnel. The cost of these measures must be recovered by an increase in efficiency, which should also provide a surplus to be shared between the parties concerned in the production, this surplus being an important part of the contribution of forestry to the steady increase of the national income, and thus also of the standard of living.

However, the small forestry concern also has certain possibilities for increasing its efficiency, especially through various forms of co-operation. This co-operation cannot, however, wholly counterbalance the advantage of the large forest enterprise with its larger operational units under unitary management. Even with far-reaching co-operation there still remains the lag in application of the technological progress and the cost-increasing effect of sub-division of properties. To offset these factors that tend to raise costs it is important to utilize the personal contributions of the small forest owners; to this end they must be provided with a certain amount of training, but above all their interest in forestry and in its economic importance to their economy must be fostered.

The increase in efficiency, which is reflected in better economy in the use of labour in the forest enterprise, should also be clearly in line with the public interest. It must be observed in this connection, however, that in a forest enterprise combined with farming the labour that may be saved by mechanization or other measures cannot always be otherwise employed profitably enough to cover the cost of these measures. In these cases such measures are

not justitfied on grounds either of private or national economics, but only to the extent of the value placed by the owner or the community on increased leisure. This point assumes greater importance as more and more leisure is provided by the other branches of employment than agriculture. But above all, attention should be given to the current tendency for a reduction of labour in agriculture with a consequently greater shortage of labour also in the small forest concern.

From the foregoing discussion on the significance of the size of the holding to the efficiency of management, it appears that the large forestry enterprise is, from the stand-point of the public interest, generally more efficient than the small unit under its present state of co-operation.

2. Policy considerations

The significance of the form of ownership for the forest economy is manifested, as has been shown, primarily through its influence on policy. From the economic aspect of the public interest the policy for forestry as a branch of the national economy and for each individual forest owner should be formulated with a view to ensuring the highest national income in the long term.

So general and abstract a policy which bears no relationship to the owner's own interest can clearly not be expected to find many followers. It has previously been shown that the policy for the private forest owner would be to co-ordinate forestry with his other activities to ensure the best economy for the enterprise as a whole. As a result of this principle certain common policies may be formulated for the various ownership groups and the corresponding forms of forest ownership, as has been outlined above in quite general terms in the discussion of State, industrial and farm forestry. To what extent, then, do these policies correspond to the public interest and thereby contribute to its realization?

According to the classical economists the attempts of private individuals to ensure the highest margin of profit would result also in the highest total production for the community as a whole. This thesis certainly owes its validity to the hypothetical static economy just as to the hypothetical dynamic economy, in which full mobility and immediate adaption of the resources to the changed conditions are assumed. Experience has shown, however, that it does not function wholly satisfactorily in the existing community which, by virtue of its complex structure and increased dependence on fixed production factors, is by no means easily adapted to change without disruption arising from idle capacity. This has been manifested most clearly in times of economic depressions.

So far as forestry is concerned the apprehensions have mainly been caused

by the feared decline of the future yield from the forests. This has resulted in a forest policy on the part of the public agencies which at different times in the past has taken on different aspects, all the while aiming to achieve a sustained yield from the forests. Our national forest inventories and our calculations of the allowable cut founded on these inventories have served the same purpose.

Discussion on the policies of various forms of forestry enterprise has, however, been centred on the investments in forestry measures and growing stock. It is certainly true that a weakening market for forest products and more general trade depressions may obstruct the realization of these policies, especially with respect to the extent of the silvicultural measures undertaken, but just how much such conditions would affect the investment policies by different groups of forest owners today is difficult to say, since these conditions have not been experienced since the 1930s.

The recently conferred right to make tax-free reservation from the income derived from felling to a forest fund for meeting the expenses of regeneration has provided the smaller forest owner with a better opportunity for avoiding the curtailment of silvicultural measures due to fluctuations in the economic situation which cannot be avoided in a branch of the national economy so dependent upon the world market as the forest industries.

To turn to the forestry policies of the various forms of ownership as they are defined above from the aspect of the best financial results for the enterprise in which forestry is an integral part, the deciding question is whether this policy can in itself be considered to differ from the national economic policy — achievement of the highest national income.

The policy for *industrial forestry* has been stated, with some simplification, as aiming at the production of the highest yield of raw material for the associated conversion industries. As it is in the interest of the community that the long-term supply of raw material to the important industries should be guaranteed in this way, it is difficult to find any real conflict between this policy and the public interest.

In the case of the *farm forestry* enterprise it would seem, also, that if it is in the interest of the owner to manage his forest in such a way that, in co-operation with his other activities — primarily farming —, it provides the greatest income in the long term, this policy too should be in line with the public interest. This policy pre-supposes that the resources — the agricultural land, the forest and the labour — are being well exploited and properly balanced. By this policy the forest industries should eventually also be assured of a good supply of raw material.

The policy for the *State forestry* eventually leads to investments in silviculture and growing stock beyond the economic limit; that is, to a point beyond that which is compatible with the best utilization of investments

from the general aspect of the national economy. In the application of the policy there appears, however, to be a modification in the direction of a balancing of investments more in keeping with national economics.

It would appear, then, from this review that the policies outlined above for all the forms of ownership tend to contribute more or less fully to the realization of the national economic policy — the highest long-term national income.

The suitability of the various forms of ownership from the aspect of the national economy is then not primarily a matter of their respective policies, but rather of how these policies are *realized.*

3. Difficulties in the realization of the forest policies

The difficulties inherent in the realization of the policies pursued under the various forms of ownership are to some extent related to the actual form of ownership, although in some ways independent of it.

The connection with the form of ownership can be traced in two respects: how the policy affects the *long-term perspective* with regard to investments in forestry; and the *competition* between forestry and other activities in the same enterprise for the resources available for investment.

An important feature of investments in forestry is the long period that usually elapses before they give returns. It is therefore essential to look far ahead regarding investments in forestry, but not all forest owners are able, or inclined, to do so.

With regard to the *long-term perspective* State forestry undoubtedly holds the strongest position. Next come the large integrated enterprises with conversion plants which require a guaranteed long-term supply of raw material. The long-term perspecitve of these two groups of forest owners is expressed in the drawing up of working plans for their forests which, in the present-day large-scale forestry enterprise, is considered to be essential for sustained yield and rational forestry, with the need for long-term planning of the silvicultural measures as well as the cut. It is self-evident that the owner of the farm forest is not in a position to observe the same long-term perspective in his investments. The limited span of a life-time influences the investment, especially if he is unable to secure the fruits for his successors. When the farms are no longer handed down to descendents as they were, either because there are no heirs or because the heirs are not disposed to take over the property, there will inevitably be a falling off of interest in long-term investment.

The question of *competition* between forestry and other activities in the same enterprise for investment capital is evidently not applicable to the

State forestry.[1] Such competition must inevitably exist in the other forms of ownership treated here. Thus, the industrial enterprise is compelled to balance its investments between forestry and the conversion industry. It is, however, to be observed that both aim eventually at the best yield of the conversion industry. The important thing is that the investment in forestry, which would ensure the long-term exploitation of the industry, should not be neglected for the sake of more immediate profit from the rationalization measures in the industry.

This problem is somewhat different for the farm forestry. The factor of competition and the balancing of investments apply, not to one, but to two fields of production — agriculture and forestry. Investments in forestry will in this case not benefit agriculture in the same way as investments in industrial forestry benefit the associated conversion industry. As regards efficiency in the use of labour, which should be the main advantage of the combination between the farm and the forest, this common agency can be a source of weakness with respect to investments in silvicultural measures as both activities require labour at the same time. In this competition for labour forestry is the weaker party, the measures in agriculture being of a more compelling nature and usually giving an immediate yield. The investments in growing stock are also affected by this competition, especially by the need for investments in farm buildings and inventories which are often financed by the cut. Thus it is only natural that the balancing of the investments between forestry and agriculture should vary widely. Moreover, they are considerably influenced by the particular interest that the owner has in one or the other activity and by his ability to judge the profitability of alternative long-term investments.

From the above it may be concluded that as regards the possibility of pursuing a long-term investment policy, as well as of the balancing of investments between forestry and the other activities in the enterprise, State forestry appears to be most in accordance with national economic objectives. Close to State forestry come the great integrated concerns in the forest industry. Farm forestry takes third place.

The importance of this order should, however, not be exaggerated. Investments in forestry are influenced by a large number of other factors. On the other hand, neither should the importance of the order be underestimated. It expresses a general tendency and in this respect tends to manifest itself where it is not overshadowed by these other influences.

These other influences are not necessarily directly connected with the form of ownership, but they are related to *personal aspects* of the management of an enterprise. Examples of such influences are the general ability

[1] The State-owned forest industries are managed by an administrative body, Statens Skogsindustrier (State Forest Industries), independently of the Forest Service.

of the owner or the manager, the access to technical knowledge, interest in forestry, the financial status of the enterprise or of the owner, the choice between consumption and saving and the shortage of labour or the unwillingness to supply it. In addition the forest policy pursued is by no means always in accordance with the requirements of business economics. The owner often in a vague general way aims at a maximum income from his forest — but he may not necessarily be willing to make the corresponding investments. Mature timber stands with stagnant growth may be retained by some private owners only for the sake of prestige; hunting interests may encroach on silviculture, as is the case in respect of the moose in Sweden; exaggerated regard for out-dated traditions and factors of inertia in the conversion from antiquated forms of farming (forest grazing) may distort forest management. Finally, there is the effect of taxation of forest land on investments in a manner that often conflicts not only with the owner's financial policy but also with the national economic policy. Similarly, the sub-division of property may in many cases thwart the best intentions of applying rational silviculture.

These and other influences may tend both to increase and to diminish investments in forestry, but there is no doubt that their joint effect is unfavourable as regards investments in silvicultural measures and growing stock.

A particular influence that has had disastrous consequences for sustained-yield forestry is the speculation in forest estates and the resulting exploitation and reduction in the volume of standing timber, which has been a feature in all countries where it has not been arrested by legislation. This speculation has been favoured by the ignorance of small forest owners of the value of the forest, and again, through the difficulty of making profitable an old and slow-growing forest stock, when the owner lacked the knowledge of other ways of making the forest capital a profitable investment.

According to the ways in which these and possibly other agencies combine with the general policies of the various forms of forest ownership this has resulted in the greatly diversified types of management of the forests that are found in reality. Herein lies also the reason why the actual forest enterprise may be far removed from the national economic policy — that is, the highest national income in the long term. These deviations would be considerably greater than they actually are were it not for the forest legislation and other measures introduced to safeguard the public interest in maintaining the forest yield in most countries where forestry is of any importance. By advice, education and subsidies to the smaller owners, attempts have been made to counteract the weakenesses of this group.

Experience has shown that, in all countries with a strong and stable government, the State best realizes the public interest in forestry — if now and

then inadequately — when some attention is devoted at the same time to social considerations. Experience has also shown that in those countries where an integrated forest industry requiring large investments has had the opportunity of acquiring its own forests, consideration for the future supply of raw material has resulted in sustained-yield forestry and rational silviculture for this form of ownership earlier than in other forms of private ownership. In the private sector, the pulp and paper industry has in all countries been leading the development towards sustained yield and rational silviculture. In Sweden, however, the pulp industry has in this respect had a forerunner in the iron industry, which already as early as in the seventeenth century was the creator and promoter of the idea of sustained yield forestry, which has since characterized forestry in the Swedish mining districts.

Other private forest owners, whether or not associated with agriculture, as a rule are more or less lagging behind the State and the modern integrated forest industry in respect of forest management. The standard attained varies widely in different countries, in spite of the fact that the public as a rule has attempted, as far as it has been able, to raise this standard both through legislation and active measures. It should, however, be mentioned that silviculture on the large estates with access to trained personnel is generally on a high level — as is the case in Sweden.

If, against this background, we consider the development and the present situation in Sweden we find in principle the same differentiation between the forms of forest ownership with regard to their forest management. However, as far as the large group of farm forests is concerned the development has been more favourable than for the corresponding group in most other countries. An important reason for this probably lies in the fact that modern forest policy, with its concentration on active measures for the promotion of silviculture, has influenced the development in the Scandinavian countries earlier and more effectively than has been the case in most other countries — a consequence of the important place the forest industries occupy in these countries, which has made forestry the concern of the whole nation. Another important factor is the great extent and significance that the various forms of co-operation have attained in Sweden on the initiative of the forest owners. Mention should be made also of the great importance of the personal element as this finds expression in the thriftiness of the forest-owning farmers, their general ability, their alertness in seizing upon new ideas and methods, and their growing interest for the increasingly important part of their economy represented by their forest property.

At the same time it is evident that variations between the individual forest owners in the standard of management and silviculture is considerably greater for the farm forests than for the other forms of ownership. The

explanation of this greater spread lies in the varying combinations between forestry and farming in some quarter of a million forest holdings, but also the widely divergent possibilities that the owners have for forest management. This has clearly contributed to the difficulty in forming a comprehensive judgment on the management and silvicultural standard of the farm forest, and it also explains the contradictory judgments that have been made regarding them.

In the discussion that has been going on about the management of the farm forests it has generally been overlooked that the essential thing is not to compare the farm forest with the forests under other forms of ownership, in as much as the present distribution of ownership could not be changed a great deal on that account, but to ascertain to what extent the farm forests as well as other categories of forests have deficiencies that should in the interest of the community be removed sooner rather than later. Irrespective of the results that will be obtained by the newly appointed commission to investigate the standard of silviculture and forest management on the various forms of ownership, it is the general opinion that the least efficiently managed part of the farm forests, as of other forests, are not in line with the national economic policy.

To throw further light on the question of the importance of the variations in case of the farm forests, we quote a statement by R. E. Marsh, former forest economist of the United States Forest Service, who, at the request of the U.S. Chief Forester, visited Scandinavia and Finland to study the forest policy with particular respect to the general measures for promoting forest management.[1] Mr. Marsh states: "The major problem is still the farm forest. Perhaps typical is the estimate of one county forest officer that of the farm forest land in his county 25 per cent is under very good forestry with frequent thinnings, 25 per cent is fairly satisfactory, 40 per cent meets the law but lacks thinnings, and 10 per cent is poor".

VIII. Summary

The size of the forestry holding and the form of ownership are two main factors that are of significance for the financial result of the forestry enterprise. Other factors, independent of these two, are related to the personal qualities of the owner or the management and may to a large degree determine the financial result through their influence on efficiency and on

[1] Public policy toward private forest land in Sweden, Norway and Finland. Wash. D.C., 1954.

policy. As they are not associated with the form of ownership or the size of holding they have not been analysed in detail in this study.

The influence of the *size of the holding* on the financial result is manifested chiefly through its effect on the *efficiency* of operations, whereas the *form of ownership* exerts its influence through its effect on the *policy* pursued by the forestry enterprise.

The possibilities for increasing *efficiency* through rationalization and the engagement of skilled labour and trained personnel are greater for the large than for the small forestry enterprise. However, the small enterprise may also raise its efficiency — chiefly through some form of co-operation. This co-operation may, however, not fully balance the advantage of large-scale operation and unitary management inherent in the large enterprise. Even with far-reaching co-operation there remains the lag in the utilization of the advancements in logging and silviculture, and also the fact that the individual forest holdings, although co-operating in some respects, still do not represent a management unit, and therefore still have greater relative costs. If these factors are to be offset it is important to exploit to the full the initiative of the individual forest owners. This calls for some forestry training in order as far as possible to overcome the lack of skilled labour and trained personnel, but also, and above all, to stimulate the initiative of the small forest owners. The biggest obstacle to this probably lies in the difficulty in combining the two activities, the small forestry enterprise generally being integrated with farming, which, through its more compelling character, engages the major part of the time and interest of the owner. Where an interest in forestry does in fact exist, and the owner is willing to devote some labour to this branch of his economy, the small holding can be managed even more intensively than the large.

That, even with the present forms of co-operation exercised by the small enterprise, the large holding is the more efficiently managed need not in itself constitute a reason for discriminating against the small holding. Rather, an intensification of the measures for raising the efficiency should be promoted, by suitable measures on the part of the public agencies.

The chief means to this end are the provision of training in silviculture, felling, laying off the felled trees into log lengths, and the proper care of the felled timber. Present forms of co-operation should be extended and new forms tried out. Care must be taken, though, that the interest and initiative of the forest owners are not prejudiced thereby, but instead stimulated.

To minimize the obstruction of the measures for raising the efficiency arising from the present sub-division of the forest holdings, it is of im-

portance to all forms of ownership that they co-operate in adjusting the boundaries so as to effect a more convenient configuration of the holdings.

It is important that greater attention be devoted to the training of skilled labour necessary for the application of mechanization and other forms of rationalization.

It should further be recognized that forestry research and education are prime factors in raising the efficiency of forestry.

The differences in the *policies* pursued by the various forms of ownership are reflected chiefly in the attitude towards investment in forestry and hence in the yield of raw material and money, and in the financial rate of return. From this aspect it is primarily the investments in silvicultural measures and growing stock (rotation) by the various forms of ownership that are of importance.

The policies of the various forms of ownership treated here — State, industrial and farm forestry — appear in principle to contribute to the realization of the public interest, expressed as the maximum long-term national income, even if these policies do not wholly coincide with the public interest thus expressed.

The question of the suitability of the various forms of ownership from the standpoint of the economic aspect of the public interest is, then, not primarily one of policy, but of the *realization* of the policy.

The difficulties of realizing a sound forest policy are in some degree connected with the form of ownership, but some are independent of it.

The connection with the form of ownership may be traced in two respects — how this connection influences the attitude towards long-term investment in the forest enterprise, and the competition between forestry and other activities for the available money and labour.

In both respects State forestry seems best calculated to realize the public interest — the highest national income in the long run. State forestry is closely followed by the modern integrated industrial forestry. Farm forestry comes last.

This order may, however, be modified by other influences which are unrelated with the form of ownership; they are the personal qualities associated with the owner or the management. Among them are the general ability and financial status of the owner or management, the access to technical knowledge as well as the pursuance of other forest policies that are less rational. These other influencies tend to increase or to reduce the volume of investments in the forestry enterprise. There is little doubt, however, that their combined effect is to reduce the volume of investment in silvicultural measures and in growing stock, — that is to say, in the rotation age.

The modifying action of these influences on the general policies for the various ownership categories discussed above results in the various forms of forest management which we find in practice. This also provides an explanation for the divergence that exists between actual forestry management and the public interest. These disparities would, in fact, be greater if the community, in order to safeguard its interests in maintaining the forest yield, did not prevent more serious departure from the national economic policy by means of legislation and other measures. By providing advice, education and financial assistance to the smaller forest owners, attempts have been made to offset the weaknesses inherent in this group of forest owners.

It would seem that farm forestry in Sweden through the owner's growing interest in forestry and through the various forms of co-operation, has approached nearer to the other forms of enterprise than is the case in most other countries.

There is, nevertheless, a great variation in the standard of silviculture among the quarter of a million farm woodlands. This has made it difficult to deliver a correct judgment on farm forestry as a whole in this discussion, which has again become topical, on which form of ownership provides for the best management of the forest.

In principle, it must be regarded as an advantage that so important a national asset as the forest should be well linked through the forms of ownership with as large domains of the economy of the nation as possible. This facilitates a rational integration with the national economy at large which could never be attained so fully with one single owner even if this owner be the State.

However, this presupposes that the different categories of forest owners really do manage their forests in a rational way as an integrated part of their enterprise. When this is not the case the State will have to intervene with law-giving and other means of policy, including even state ownership. That the State in Sweden is the owner of a considerable part of the forest land, especially in the northern part of the country where the social aspect of providing a reasonable living to the local population by employment in forestry is quite important should moreover be considered a happy circumstance from the public point of view.